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Shallow marine to deep- burial diagenetic carbonate cements from Lower Triassic Kangan Formation, Southern Persian Gulf

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Significant amounts of hydrocarbon recourses are hosted by Lower Triassic Kangan (Upper Khuff equivalent) Formation in southern part of subsurface Persian Gulf. This carbonate gas reservoir is known to be a complex carbonate system with high degree of heterogeneity which has a direct impact on the reservoir quality. The formation consists mainly of limestone, dolomitic limestone, dolomite and evaporites. Facies analysis of reservoir indicates that Kangan Formation was deposited in shallow water ramp system, ranging from sabkha, lagoon, and shoal to open marine environments. The reservoir property is highly affected by diagenetic events such as dolomitization, cementation, micritization, compaction and dissolution. Cementation is the main diagenetic process that reduced reservoir property, by occluding pore spaces in some parts. Cathodoluminescence petrography revealed the three following calcite cement types, which are generated during early to burial diagenesis: 1- Non-ferroan Fibrous cement consists of thin fibrous fringes (10-15 μm) and exhibits light brown luminescence. This cement was formed in Endogenetic diagenetic stages under influence of marine condition. 2- Ferroan Bladed calcite cement that exhibits bladed texture with about 30-70 μm long. It is non-luminescence and formed in Mesogenetic diagenetic stages with possible origin of meteoric and mixing-zone waters. 3- Ferroan Blocky calcite cements which is characterized by coarse crystalline (200-350 μm) texture, displaying a dull – dark luminescence. It was generated in burial diagenesis setting with no recharge of surface waters. Dolomitic cements, other type of carbonate cements filled pore spaces and defined by the two limpid and saddle forms, CL imaging from saddle dolomite shows three main zones: ferroan –non luminescence core zone, dark brown to bright zone and dull luminescence zone. Saddle dolomite cement is scarce, and formed in deep-burial diagenesis conditions. Therefore, paragenetic sequence reconstructed based on CL observations suggests that diagenetic carbonate cements have been formed in early, burial and deep- burial diagenesis stages which cause a significant reduction of porosity in the Kangan Formation.